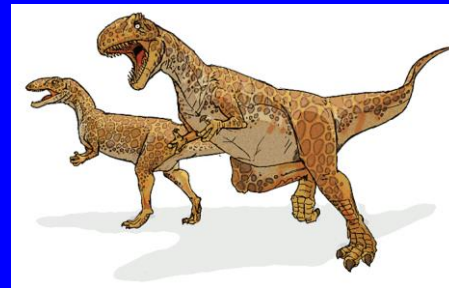


Neutron Backscattering: High Resolution Spectroscopy*

A.Heidemann

*A few personal remarks
about how it all began*



* $\Delta E/E=10^{-4}$

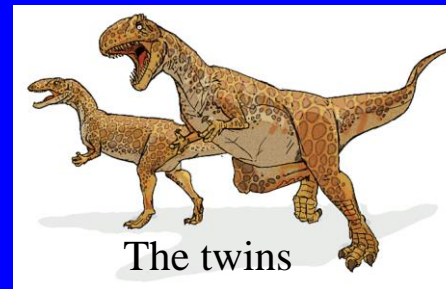
Backscattering Spectroscopy:

How it all began exactly 50 years ago:

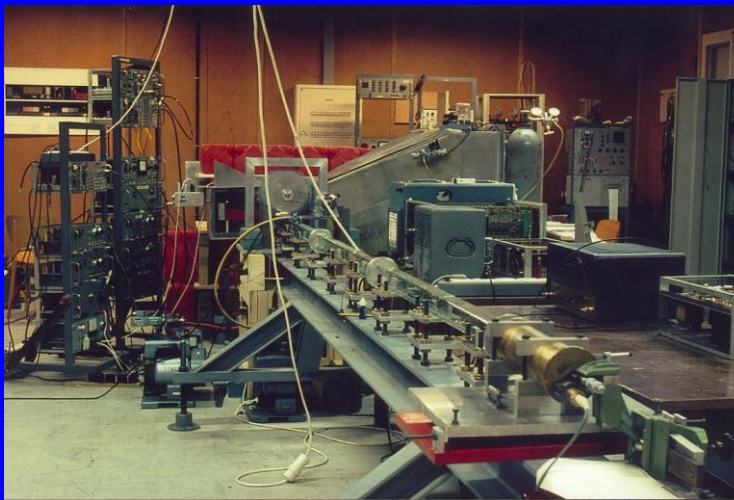
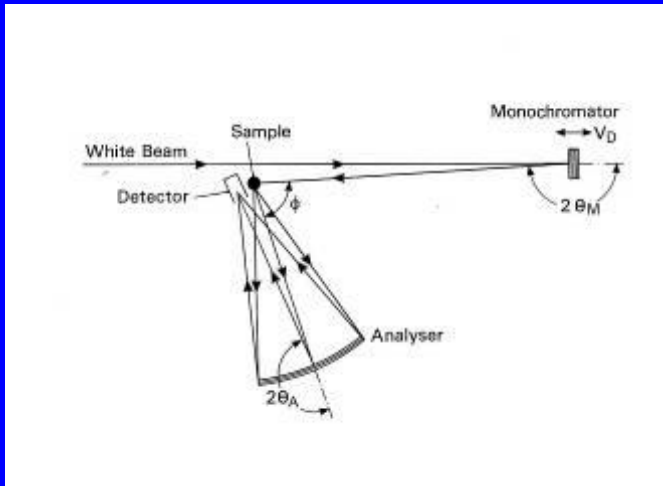


Thesis Start: Nov 1966

Doktor-Vater:
H. Maier-Leibnitz
B. Alefeld



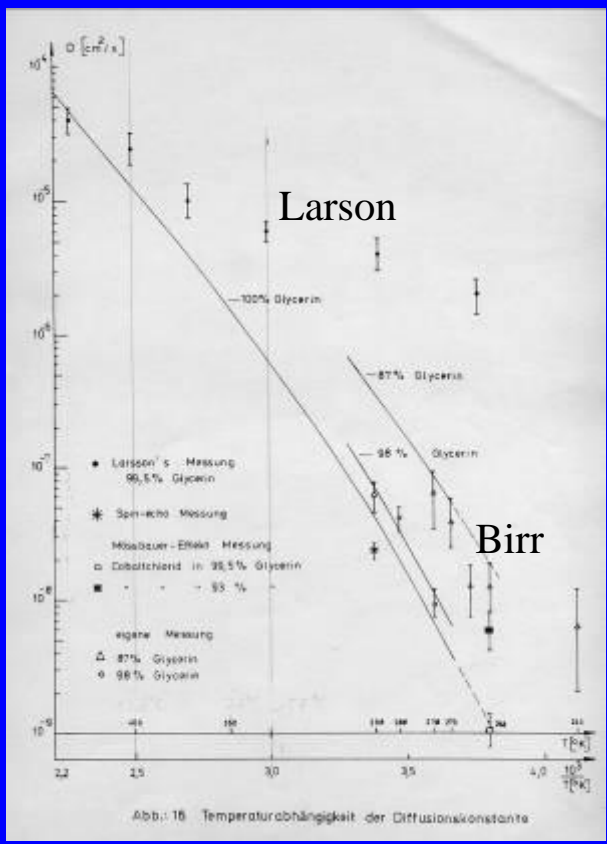
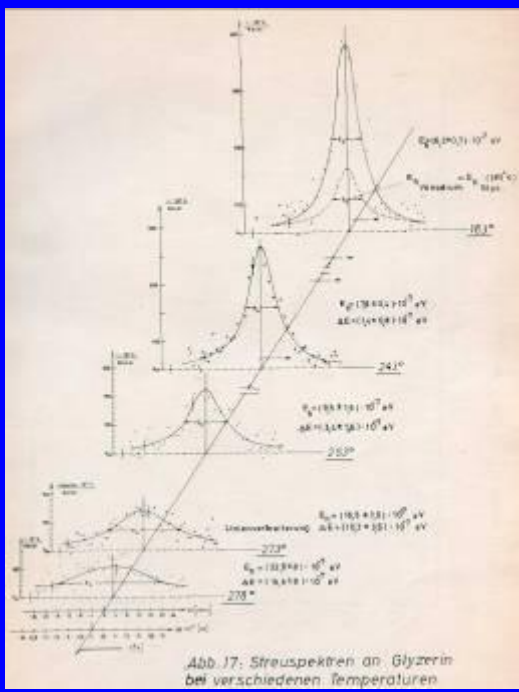
Das Rückstreu-Spektrometer Garching Mai 1968



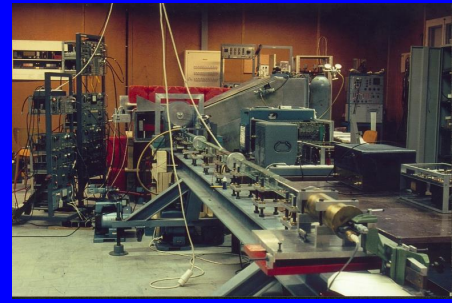
*Ceremony of
'Vorsingen'*

QNS in glycerol:1968

M.Birr



Glass Transition
Softmatter

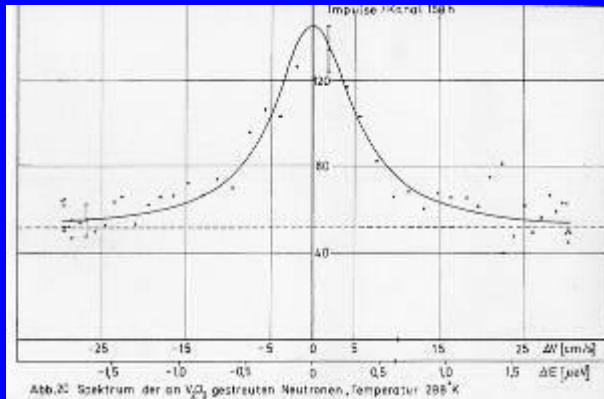


Citation of a statement of ML:

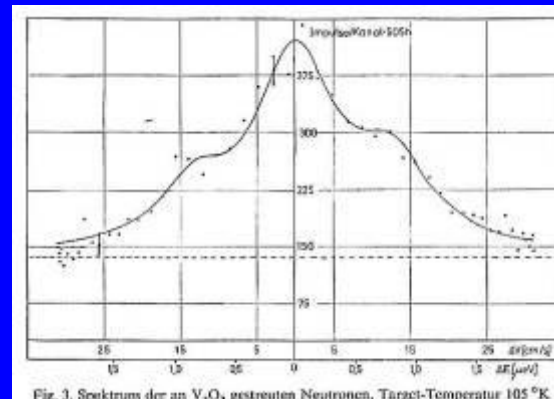
- *Die Entwicklung einer neuen Methode, wenn immer ihre Genauigkeit, Empfindlichkeit oder Auflösung sehr viel besser ist als alles auf diesem Gebiet schon Existierende, bringt « neue Physik » hervor.
(from: P.Kienle: Wie kommt man auf einfaches Neues?)*
- *The development of a new method, when ever its precision, sensitivity or resolution is much better than everything that existed in this field before, creates « new physics ».*

Inelastic Spin Flip Scattering in V_2O_3 :

Hyperfine Interaction: Magnetism



Above T_c



Below T_c

Phase Transitions

Nuclei:

H, V, Co, Nd, Ho, ?

2 dreams:

1. Quadrupole Splitting?
2. Nuclear Spin Waves?



Important people in BS



Heinz Maier-Leibnitz



Tasso Springer



Michael Prager



Berthold Alefeld

- **Outstanding experimentalist** who produced an incredible number of new ideas in this field.
- He had what I call the **scientific instinct**. He *felt* physics.
- He has performed many **new** experiments using the BS technique.

Condensed matter physics:

- Tunnelling of CH₃ groups in di-methyl-di-acethylene.
- Self-diffusion in a sodium single crystal.
- Reorientation of NH₄ groups in molecular crystals.
- Motions in plastic and liquid crystals
- Hydrogen diffusion in metals.

Fundamental physics:

- Neutrons in the gravitational field.
- Longitudonal Stern-Gerlach effect.
- Neutron magnetic resonance shift.
- A perfect crystal storage device.

Instrument development:

- GaAs crystals as BS monochromators
- Temperature gradient monochromators
- PST as mentioned above.

Tennis Player and Tennis Writer

Berthold Alefeld



Berthold Alefeld is the father of backscattering spectroscopy.

Conclusion

Let me finish by saying that I am looking forward with curiosity to listen to the presentations of scientific results and new developments in the field of neutron BS. 50 ago we certainly could not imagine what had happened since. Manfred and myself, we consider ourselves as lucky guys who participated in opening a new field. This does not happen very frequently to thesis students.

